

## REGIONAL COMPETITION - ROUND 6

### TOSS-UP

1. ASTR; Multiple Choice: A new radiation belt has been discovered which is closer to earth than the inner Van Allen belt. How does this new belt differ from the Van Allen belts which consist mostly of protons?
  - a) it consists mostly of electrons
  - b) it consists mostly of heavy ions such as nitrogen and oxygen
  - c) it consists mostly of neutrinos
  - d) it consists mostly of helium

ANSWER: B--IT CONSISTS MOSTLY OF HEAVY IONS SUCH AS NITROGEN AND OXYGEN

### BONUS

1. ASTR; Short Answer: Which comet is responsible for the debris that produces the Perseid (Per-sea-id) meteor shower each August?

ANSWER: SWIFT-TUTTLE

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### TOSS-UP

2. BIOL; Short Answer: What is a population of ants living as a group called?

ANSWER: A COLONY

### BONUS

2. BIOL; Short Answer: What disease did August von Wassermann develop a specific test for in 1906?

ANSWER: SYPHILIS

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**TOSS-UP**

3. PHYS; Multiple Choice: When measuring the air pressure in the tire of an automobile this pressure is called the:
- a) absolute pressure
  - b) atmospheric pressure
  - c) gauge pressure
  - d) vacuum pressure

ANSWER: C--GAUGE PRESSURE

**BONUS**

3. PHYS; Multiple Choice: The gauge pressure is equal to:
- a) the absolute pressure minus the atmospheric pressure
  - b) the atmospheric pressure minus the absolute pressure
  - c) the vacuum pressure minus the atmospheric pressure
  - d) the vacuum pressure minus the absolute pressure

ANSWER: A--THE ABSOLUTE PRESSURE MINUS THE ATMOSPHERIC PRESSURE

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**TOSS-UP**

4. CHEM: Short Answer: What were the four great elements recognized by the ancients?

ANSWER: EARTH, AIR, FIRE AND WATER

**BONUS**

4. CHEM: Short Answer: Who invented the mercury thermometer?

ANSWER: (GABRIEL) FAHRENHEIT

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**TOSS-UP**

5. GENR; Multiple Choice: Limnology may be described as:
- a) the study of external anatomy
  - b) the science of lakes
  - c) the science of trees
  - d) the study of lunar eclipses

ANSWER: B--THE SCIENCE OF LAKES

**BONUS**

5. GENR; Multiple Choice: Lakes evolve. What is the term that is applied to a young lake whose water is highly oxygenated and sparsely populated by plants?
- a) dystrophic
  - b) mesotrophic
  - c) eutrophic
  - d) oligotrophic

ANSWER: D--OLIGOTROPHIC

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**TOSS-UP**

6. COMP; Short Answer: What was the first working Local Area Network developed by a team headed by Dr. Robert Metcalf?

ANSWER: ETHERNET

**BONUS**

6. COMP; Short Answer: What is the major standards setting body in the LAN industry that was formed in 1980 with the express task of defining industry wide standards for Local Area Networks?

ANSWER: THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (ACCEPT IEEE)

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**TOSS-UP**

7. CHEM: Multiple Choice: What kind of reaction occurs when a system in equilibrium experiences an increase in temperature?
- a) exothermic
  - b) endothermic
  - c) spontaneous
  - d) accelerated

ANSWER: B--ENDOTHERMIC

**BONUS**

7. CHEM: Short Answer: Lithopone white paint is made by heating a mixture of barium sulfide and zinc sulfate. What are the products of this reaction?

ANSWER: BARIUM SULFATE AND ZINC SULFIDE

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**TOSS-UP**

8. BIOL; Short Answer: Where are the Haversian canals?

ANSWER: IN THE BONES

**BONUS**

8. BIOL; Short Answer: Where are a snail's reproductive organs?

ANSWER: THE SNAIL'S HEAD

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### TOSS-UP

9. PHYS; Multiple Choice: A 500 Hz sound wave travels through the atmosphere at 340 m/s. What is the wavelength of this sound wave?
- a) 0.34 m
  - b) 0.68 m
  - c) 1.00 m
  - d) 1.47 m

ANSWER: B--0.68 M

### BONUS

9. PHYS; Multiple Choice: Light moving through a medium encounters a second medium that has a smaller index of refraction. If the angle of incidence is greater than the critical angle, what happens to the light when it reaches the interface?
- a) It is totally reflected
  - b) It is totally absorbed
  - c) It is totally transmitted
  - d) It is partly transmitted and partly absorbed

ANSWER: A--IT IS TOTALLY REFLECTED

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### TOSS-UP

10. ERSC; Multiple Choice: A river or stream that is in dynamic balance between its speed, gradient, and discharge is in a state known as:
- a) Metered
  - b) gauged
  - c) graded
  - d) overflow

ANSWER: C--GRADED

### BONUS

10. ERSC; Multiple Choice: Phenomena such as avalanches, mudflows, and creep are examples of the diverse kinds of downslope movements known collectively as:
- a) solifluction
  - b) mass-wasting
  - c) gravity
  - d) shearing

ANSWER: B--MASS-WASTING

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**TOSS-UP**

11. BIOL; Short Answer: How many tentacles does a squid have?

ANSWER: TEN

**BONUS**

11. BIOL; Short Answer: Which fruit is used in the dye for government inspector's meat stamps?

ANSWER: THE GRAPE

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**TOSS-UP**

12. PHYS; Multiple Choice: Three light bulbs are wired in parallel across a 6 volt ideal battery. If one bulb burns out, what happens to the other two?

- a) they get brighter
- b) they get dimmer
- c) they also burn out
- d) they stay the same

ANSWER: D--THEY STAY THE SAME

**BONUS**

12. PHYS; Short Answer: The x-rays which are produced by the sudden deceleration of a moving charge are known by the German name meaning "braking radiation". What is the name?

ANSWER: BREMSSTRAHLUNG

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**TOSS-UP**

13. CHEM: Multiple Choice: Natural rubber is a polymer of:

- a) ethylene
- b) propene
- c) isoprene
- d) 2-chloro-toluene

ANSWER: C--ISOPRENE

**BONUS**

13. CHEM: Multiple Choice: Which of the following substances will have the largest entropy per mole at 300 C?

- a) water (liquid)
- b) HCl (liquid)
- c) carbon dioxide (gas)
- d) C (diamond)

ANSWER: C--CARBON DIOXIDE (GAS)

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**TOSS-UP**

14. MATH; Short Answer: A plane can slice a cone in four fundamental ways. Name the four curves that result.

ANSWER: CIRCLE, ELLIPSE, PARABOLA, HYPERBOLA

**BONUS**

14. MATH; Short Answer: What is the ring formed by two concentric circles known as?

ANSWER: ANNULUS

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**TOSS-UP**

15. GENR; Multiple Choice: What is the largest source of radiation to the average individual?
- a) Occupational Radiation Exposure
  - b) Medical Exposure
  - c) Natural Background
  - d) Consumer products

ANSWER: C--NATURAL BACKGROUND

**BONUS**

15. GENR; Short Answer: What is the more common name for a pluviometer (pron: pul-ve-ah-eter)?

ANSWER: RAIN GAUGE

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**TOSS-UP**

16. BIOL; Short Answer: What is the hardest bone in the human body?

ANSWER: THE JAW BONE

**BONUS**

16. BIOL; Short Answer: What is the most extensively grown and eaten food?

ANSWER: WHEAT

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**TOSS-UP**

17. ASTR; Short Answer: Which rule must be followed by astronomers naming landmarks on the planet Venus?

ANSWER: THEY MUST BE NAMED FOR FAMOUS WOMEN (REAL OR MYTHOLOGICAL)

**BONUS**

17. ASTR; Multiple Choice: How far from earth in astronomical units, is the most distant minor planet yet observed in our solar system, a body called 1992 QB1?
- a) 1 a.u. (astronomical units)
  - b) 12 a.u.
  - c) 42 a.u.
  - d) 79 a.u.

ANSWER: C--42 A.U.

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**TOSS-UP**

18. PHYS; Multiple Choice: A block of metal which weighs 50 newtons in air and 40 newtons under water has a density, in kilograms per meter cubed, of:
- a) 1000
  - b) 3000
  - c) 5000
  - d) 7000

ANSWER: C--5000

**BONUS**

18. PHYS; Short Answer: Assume the acceleration of gravity to be 10 meters/second squared. A 60 kilogram girl climbs a vertical distance of 4 meters in twenty seconds at a constant velocity. In Joules, how much work has the girl done?

ANSWER: 2400 JOULES

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**TOSS-UP**

19. CHEM: Short Answer: What is the principal form of benzoic acid in an aqueous solution at pH 8?

ANSWER: THE BENZOATE ANION,  $\text{C}_6\text{H}_5\text{CO}_2^-$

**BONUS**

19. CHEM: Multiple Choice: One mole of super cooled water at -10 degrees C and 1 atmosphere turns into ice. The net entropy change for the surroundings is:
- a) greater than zero
  - b) less than zero
  - c) no change
  - d) not enough information given

ANSWER: A--GREATER THAN ZERO

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**TOSS-UP**

20. ERSC; Multiple Choice: The second and third most abundant elements in the Earth's crust are:
- a) silicon and oxygen
  - b) magnesium and nitrogen
  - c) iron and sulfur
  - d) silicon and aluminum

ANSWER: D--SILICON AND ALUMINUM

**BONUS**

20. ERSC; Multiple Choice: Rocks altered by heightened heat or pressure have been,
- a) metasomatized
  - b) meteorized
  - c) migmatized
  - d) metamorphized

ANSWER: D--METAMORPHIZED

**TOSS-UP**

21. COMP; Short Answer: The amount of memory that can be addressed by an IBM PC or XT, or by 286- and above machines when running in real mode, typically 640 KiloBytes (KB), is called

ANSWER: CONVENTIONAL MEMORY

**BONUS**

21. COMP; Short Answer: A storage area in random access memory (RAM) where the computer temporarily places data that is being transferred from one device to another, usually during Input\Output operation is called:

ANSWER: BUFFER

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**TOSS-UP**

22. BIOL; Short Answer: What animal has the highest blood pressure?

ANSWER: THE GIRAFFE

**BONUS**

22. BIOL; Multiple Choice: Leatherback sea turtles dive very deep and avoid the "bends" which are caused by nitrogen bubbles by having small lungs. Small lungs also are able to:

- a) help the turtle get plenty of oxygen
- b) keep the turtle from being crushed by pressure during dives
- c) help keep the turtle buoyant so it can remain floating
- d) help the turtle retain needed carbon dioxide

ANSWER: B--KEEP THE TURTLE FROM BEING CRUSHED BY PRESSURE DURING DIVES

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### TOSS-UP

23. MATH; Multiple Choice: What are four levels in statistical measurement?

- a) Nominal, Ordinal, Interval, Ratio
- b) Nominal, Ordinal, Sorting, Friedman
- c) Classificatory, Ranking, Interval, Friedman
- d) Classificatory, Ranking, Sorting, Friedman

ANSWER: A--NOMINAL, ORDINAL, INTERVAL, RATIO

### BONUS

23. MATH; Multiple Choice: What are examples of classificatory scale measurement in statistical sampling?

- a) Grades in the military service
- b) Automobile license plate numbers
- c) Socioeconomic status
- d) Temperature

ANSWER: B--AUTOMOBILE LICENSE PLATE NUMBERS

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### TOSS-UP

24. PHYS; Short Answer: Whose law of physics can be used to explain induced electric currents?

ANSWER: FARADAY (FARADAY'S LAW)

### BONUS

24. PHYS; Multiple Choice: A copper rod which is 2 centimeters in diameter carries a current of 3 amps. The current is distributed uniformly throughout the rod. The magnetic field half way between the axis of the rod and its outside edge:

- a) is zero
- b) points radially outward
- c) points radially inward
- d) circles the axis of the rod

ANSWER: D--CIRCLING THE AXIS OF THE ROD

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**TOSS-UP**

25. CHEM: Short Answer: In Thermodynamics, the ideal "Equation of State" relates what variables?

ANSWER: VOLUME, PRESSURE, TEMPERATURE, AND NUMBER OF MOLES  
(ACCEPT DENSITY INSTEAD OF VOLUME)

**BONUS**

25. CHEM: Short Answer: Specifically explain the difference between the "Ideal Gas Equation" and the "van der Waals Equation of state".

ANSWER: VAN DER WAALS EQUATION TAKES INTO ACCOUNT THE COMBINED EFFECT OF THE REPULSIVE AND ATTRACTIVE FORCES, WHILE THE IDEAL GAS EQUATION DOES NOT

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